IDENTIFYING RISK THRESHOLDS IN COASTAL COMMUNITIES TO INFORM ADAPTATION PLANNING

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BNHCRC AND AFAC 2017 ANNUAL CONFERENCE

THE IMPACT OF CHANGING COASTAL INUNDATION HAZARDS TO PEOPLE AND PROPERTY BECOMES INCREASINGLY UNCERTAIN ACROSS MULTI-DECADAL TIMEFRAMES. IDENTIFYING 'THRESHOLDS' CAN BETTER INFORM LONG-TERM COASTAL ADAPTATION PLANNING AT LOCAL, STATE AND NATIONAL SCALES.

RESEARCH QUESTIONS

- Many Australians live near the coast, with over 270,000 houses threatened by 1.1m of sea-level rise [1]. Changing coastal flood regimes, population growth and other factors can increase community impacts from inundation events. This research develops a methodology to identify:

  1. What environmental change causes unacceptable impacts to people and property along the coast?

  2. When might such change occur?

MAIN FINDINGS SO FAR

- 'Robust Decision Making' [2] provides a quantitative basis to explore many different future scenarios (i.e. cases) and identify thresholds, which are changes to the built and natural environment beyond which community impacts from inundation are unacceptable.
- A methodology to identify thresholds is currently being trialled on a coastal community in Tasmania (Box 1) [3].
- The adaptation objectives relate to people (i.e. average annual people exposed, AAPE) and property (i.e. average annual damages to houses, AAD).
- Establishing thresholds allows adaptation responses to be better planned, focussing on those uncertain changes that most affect the adaptation objectives.

Box 1. Overview of the method being piloted on a case study site in Tasmania

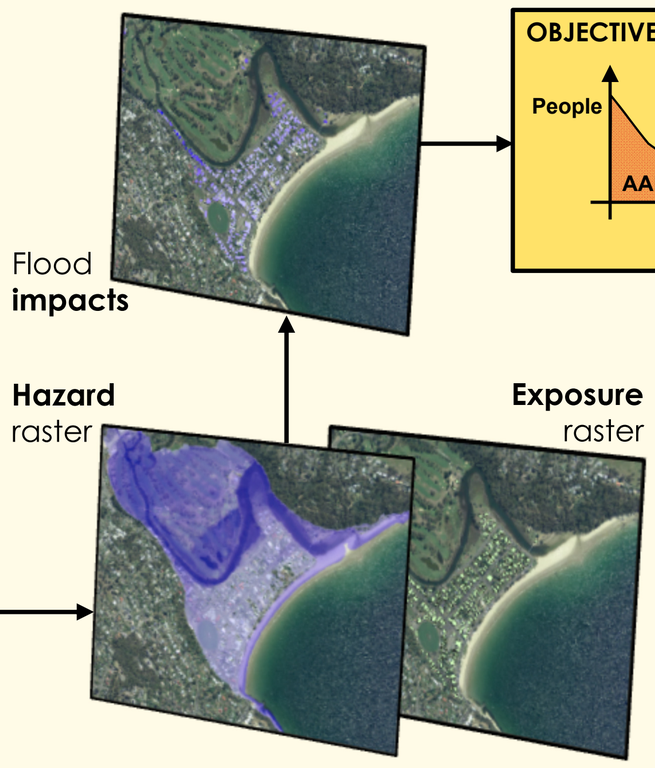
1. Define adaptation objectives

(e.g. minimising increase to AAPE and AAD from inundation)

2. Define environmental and built variables whose future state is **uncertain.**

3. Generate database of cases (hundreds to thousands) by random sampling of the uncertain variables.

	Uncertainties		
Case	X	Y	Z
1			
2			
3			
…			
1000			

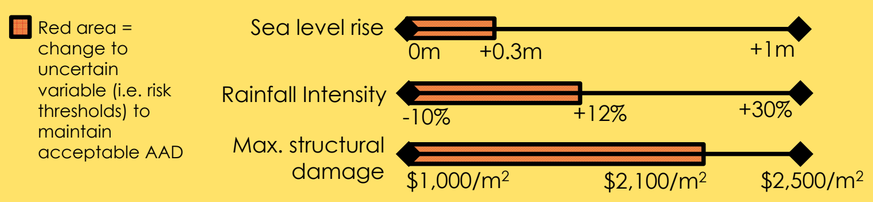


4. Using GIS tools, **simulate impacts** to the adaptation objectives for each case.

Write results to case database

	Uncertainties			Impacts	
Case	X	Y	Z	Obj. 1	Obj. 2
1					
2					
3					
…					
1000					

4. Identify thresholds by applying a data mining algorithm to identify a small number of parameters (and values) that best predict successful attainment of adaptation objectives - see illustration below:



5. Project **timing** of uncertain changes by using latest scientific trends and observations. Adaptation responses can then be **planned** with the timing of implementation.

CONTRIBUTING TO END-USER NEEDS

- *"Understanding when the impacts of climate change will pass the tipping point to becoming an acute problem for communities, is critical to support the development and implementation of adaptation strategies by the State and local governments"* *(Luke Roberts, Department of Premier and Cabinet)*

REFERENCES

[1] Commonwealth of Australia, 2011. Climate Change Risks to Coastal Buildings and Infrastructure – A supplement to the first pass national assessment. Commonwealth of Australia, Canberra.
[2] Lempert, R.J. et al, 2013. Making Good Decisions Without Predictions. RAND Corporation.
[3] Ramm, T.D. et al, 2017. Identifying thresholds in an uncertain world: Supporting coastal adaptation planning. *In preparation.*

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